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EFFECT AND PROCESS EVALUATION OF A PARTICIPATORY ORGANIZATIONAL INTERVENTION FOCUSING ON CORE JOB TASKS

BY
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AALBORG UNIVERSITY
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ENGLISH SUMMARY

The thesis presents the results from the PhD project 'Effect and process evaluation of a participatory organizational intervention focusing on core job tasks'. I conducted the PhD project from June 2013 to May 2016 at Aalborg University Copenhagen and at the Danish National Research Centre for the Working Environment. I used data from a large scale workplace intervention project conducted in Danish pre-schools, called Pioneer project. The Pioneer project aimed to improve the psychosocial working environment by focusing on core job tasks. This PhD thesis was a part of this larger project and had three aims: i) to examine the implementation of the Pioneer project, ii) to examine whether the Pioneer project led to increased level of job satisfaction and a decreased level of exhaustion and sleep disturbances, and to iii) examine whether the Pioneer project led to reduced risk of short-term sickness absence.

Based on 12 in-depth interviews, I examined in the first study how focusing on core job tasks supported or hindered the implementation of the Pioneer intervention. I found among four selected intervention group workplaces that the workplaces addressed professional and organizational conditions, such as improving the communication, organization of staff meetings, and working and holiday schedules, that are needed to improve the performance of core job tasks. Focusing on core job tasks supported the implementation of intervention activities along with employee participation and management support. There were however, both supportive mechanisms and hindrances associated with workplaces' readiness for change and the organizational fit of the intervention depending on workplaces' appraisal of the intervention. The analyses suggest that the focus on the core task had the potential to compensate for hindrances related to lack of readiness and fit.

In the second study, I examined whether employees in pre-schools that implemented the Pioneer intervention experienced an increasing level of job satisfaction and a decreasing level of exhaustion and sleep disturbances compared to control group employees during a 24 months follow-up. Within-group analyses showed that exhaustion decreased statistically significantly in both the intervention and the control group. There was no statistically significant change in job satisfaction and sleep disturbances, neither in the intervention nor in the control group. Between-group analyses showed that there was no statistically significant difference between the intervention and the control group for any of the variables, neither in the crude nor in the adjusted analyses. Adjustment for baseline values of the outcome variables did not change the results.

In the third study, I examined whether employees in pre-schools that implemented the Pioneer intervention had a reduced risk of short-term sickness absence compared to control group employees during a 31 months follow-up with data available for 29 months. The study showed that the estimated number of short-term sickness absence days per person-year during follow-up were 8.68 and 9.17 in intervention and control group, respectively. The rate ratio (RR) for comparing incident short-term sickness absence in intervention to control group during follow-up was 0.93 (95% CI=0.86-1.00) in the crude analysis and 0.89 (95% CI=0.83-0.96) when adjusting for age, sex, job group, workplace type and size, and workplace average level of short-term sickness absence in the 12 months preceding the intervention indicating that the intervention had led to a decreased risk of short-term sickness absence. A supplementary analysis showed that the intervention was also associated with a reduced risk of long-term sickness absence with a crude RR of 0.83 (95% CI=0.69-0.99) and an RR of 0.84 (95% CI=0.69-1.01) in the fully adjusted model.

In conclusion, the core task focus supported the implementation of intervention activities. The intervention was efficacious with regard to sickness absence, but not with regard to job satisfaction, exhaustion and sleep disturbances. Theoretical and methodological explanations for the mixed findings are discussed in the thesis.

DANSK RESUME

Denne afhandling præsenterer resultaterne fra ph.d.-projektet 'Effekt- og procesevaluering af en participatorisk organisatorisk intervention med fokus på kerneopgaven'. Jeg gennemførte ph.d.-projektet fra juni 2013 til maj 2016 på Aalborg Universitet København og på Det Nationale Forskningscenter for Arbejdsmiljø. Jeg benyttede data fra et stort arbejdsmiljøinterventionsprojekt gennemført i danske daginstitutioner, som hedder Pionerprojektet. Pionerprojektets formål var at forbedre det psykosociale arbejdsmiljø ved at fokusere på kerneopgaven. Dette ph.d.-projekt var en del af dette større projekt, og havde tre formål: i) at undersøge implementeringen af Pionerprojektet, ii) at undersøge om Pionerprojektet førte til øget jobtilfredshed og nedsat udmattelse og søvnforstyrrelser, og iii) at undersøge om Pionerprojektet førte til reduceret risiko for kort sygefravær.

Baseret på 12 kvalitative interviews undersøgte jeg i det første studie, hvordan fokus på kerneopgaven fremmede eller hæmmede implementeringen af Pioner interventionen. Jeg fandt blandt fire udvalgte arbejdspladser i interventionsgruppen, at arbejdspladserne håndterede professionelle og organisatoriske forhold, eksempelvis forbedring af kommunikation, organisering af personalemøder og arbejds- og ferieplaner, som var nødvendige for at forbedre udførelsen af kerneopgaven. Fokus på kerneopgaven fremmede implementeringen af interventionsaktiviteter sammen med medarbejderdeltagelse og ledelsesstøtte. Der var dog både fremmende mekanismer og forhindringer forbundet med medarbejdernes parathed til forandringer, samt hvorvidt interventionen passede til arbejdspladsen afhængig af medarbejdernes vurdering af interventionen. Analyserne tydede på, at fokus på kerneopgaven havde potentiale til at kompensere for forhindringer relateret til medarbejdernes manglende parathed til forandringer samt tilfælde, hvor medarbejderne oplevede, at interventionen ikke passede til arbejdspladsen.

I det andet studie undersøgte jeg, om medarbejdere i daginstitutioner, som implementerede Pioner interventionen, oplevede et øget niveau af jobtilfredshed og et nedsat niveau af udmattelse og søvnforstyrrelser sammenlignet med medarbejdere i kontrolgruppen i løbet af en 24 måneders opfølgningsperiode. Analyser indenfor grupperne viste, at der var et statistisk signifikant fald i udmattelse i både interventions- og kontrolgruppen. Der var ingen statistisk signifikante ændringer i jobtilfredshed eller søvnforstyrrelser, hverken i interventions- eller kontrolgruppen. Analyser mellem grupperne viste, at der ikke var statistisk signifikante forskelle

mellem interventions- og kontrolgruppen for de tre variable, hverken i de ujusterede eller i de justerede analyser. Justering for baselineværdier af udfaldsvariable ændrede ikke resultaterne.

I det tredje studie undersøgte jeg, om medarbejdere i daginstitutioner, som implementerede Pioner interventionen, havde reduceret risiko for kort sygefravær sammenlignet med medarbejdere i kontrolgruppen i løbet af en opfølgningsperiode på 31 måneder med data til rådighed i de 29 af månederne. Studiet viste, at det estimerede antal dage med kort sygefravær per person-år i opfølgningsperioden var 8.68 i interventionsgruppen og 9.17 i kontrolgruppen. Rate ratioen (RR) for en sammenligning af raten i interventionsgruppen med raten i kontrolgruppen i opfølgningsperioden var 0.93 (95% KI=0.86-1.00) i den ujusterede analyse og 0.89 (95% KI=0.83-0.96) ved justering for alder, køn, jobgruppe, arbejdspladstype, arbejdspladsstørrelse og det gennemsnitlige arbejdspladsniveau i kort sygefravær i de 12 måneder forud for interventionen. Disse resultater indikerer, at interventionen førte til en reduceret risiko for kort sygefravær. En supplerende analyse viste, at interventionen også førte til en reduceret risiko for langtidssygefravær med en ujusteret RR på 0.83 (95% KI=0.69-0.99) og en RR på 0.84 (95% KI=0.69-1.01) i den fuldt justerede model.

Sammenlagt viser disse tre studier, at et fokus på kerneopgaven fremmede implementeringen af interventionsaktiviteter. Interventionen var effektiv med hensyn til sygefravær, men ikke med hensyn til jobtilfredshed, udmattelse og søvnforstyrrelser. Teoretiske og metodiske forklaringer på de blandede resultater er diskuteret i afhandlingen.

ACKNOWLEDGEMENTS

This PhD thesis is a synopsis of the results from three publications submitted to international peer reviewed journals. The manuscripts are appended in the Appendices A to C. I conducted the PhD project from June 2013 to May 2016 at Aalborg University Copenhagen and at the Danish National Research Centre for the Working Environment. I used data from the Pioneer project (Danish: Pionerprojektet).

I wish to thank the funding sources: the Danish Prevention Fund (grant number: 09-1-1a-096), the Danish Working Environment Research Fund (grant number: 28-2010-03), and the Center for Industrial Production at Aalborg University for partially funding the PhD project. Further, I wish to thank the Pioneer project management team Gunilla Martins (Municipality of Copenhagen's Children and Youth Administration), Hanne Christensen (Grontmij consultancy), and Ole Henning Sørensen (Aalborg University). I am also very grateful to all employees from the Municipality of Copenhagen's Children and Youth Administration who were involved in this study.

Thanks to Pete Kines for opening the first door for me to occupational health research. Thanks to Peter Hasle for casting me for the PhD position. Thanks to Ole Henning Sørensen for inviting me to do a PhD project within the Pioneer project. Thanks to Elsa Bach for supporting my work and to Jacob Pedersen for invaluable statistical training. Thanks to Ole Henning Sørensen and Reiner Rugulies for competent supervision and support. Finally, thanks to my PhD School and to colleagues at both Aalborg University Copenhagen and at the Danish National Research Centre for the Working Environment.

Elisabeth Framke, May 30, 2016

TABLE OF CONTENTS

TABLE OF FIGURES

CHAPTER 1. INTRODUCTION

From 2010 to 2013 a large scale workplace intervention project was conducted in Danish pre-schools, called Pioneer project. This PhD thesis was a part of this larger project and had the aim to conduct an implementation and effect analyses of Pioneer.

In this introduction, I will first briefly present the concept of organizational-level occupational health interventions and the importance of employee participation and a focus on core job tasks. Then, I introduce the Pioneer project and the key outcome measures in the project, employees' well-being and sickness absence. The chapter commenced with a description of the specific research questions that I examined in the PhD.

1.1. ORGANIZATIONAL-LEVEL OCCUPATIONAL HEALTH INTERVENTIONS

Organizational-level occupational health (OL-OH) interventions are interventions conducted at workplaces with the aim to reduce health-hazardous and to enhance health promoting work conditions, often with a focus on work related stress (1). OL-OH interventions are mainly about primary and work-directed prevention (2), that is preventive measures are taken to avoid exposure to stressors in the work situation. This approach differs from secondary prevention that addresses short-term stress reactions and tertiary prevention that treats consequences of prolonged stress. This approach also differs from person-directed prevention that aims to increase the coping skills of employees (2, 3). Examples of primary, work-directed preventive measures, i.e. the content of OL-OH intervention activities, are job redesign, ergonomic improvements, implementation of autonomous teams, rearranged working and resting times, improved communication, and increasing social support (1, 2).

The design, implementation and evaluation of OL-OH interventions are receiving attention, partly because it appears to be theoretically appealing to address the source of stressors rather than symptoms and long-term consequences of stressors and partly because of expectations regarding the potential for more sustainable effects on employees' health (4, 5). Results from these studies are, however, inconsistent and study quality is often low. This was concluded in 2006 (6) and again in 2015 in the most recent review of organizational interventions (7), which make it difficult to make a strong case for these types of interventions (4, 8).

Montano et al (7) identified in their systematic review 39 studies published between 1993 and 2012. Of those studies, 19 reported significant effects on various, mostly self-reported health outcomes. However, the majority of studies were of medium quality, and only four studies were regarded as high quality studies. The possible quality assessment scores of each intervention study varied from 0 to 12 and were based on criterions related to the presence of a control group, response rates, the use of a randomized design, statistical power, and the use of appropriate statistical methods. High quality studies were those with a randomized controlled design with a study quality greater than the median study quality. Medium quality studies used either a randomized controlled design with a study quality less than the median or used a quasi-experimental controlled design with a study quality greater than the median.

Results from an earlier systematic review, carried out by LaMontagne et al, suggests that interventions targeting the organizational level to be more effective than interventions targeting the individual (9). Based on a systematic review of health effects as a result of changes in the psychosocial work environment achieved by work task restructuring, Bambra et al (10) concluded that organizational-level interventions aimed at task restructuring may improve employee health if the restructuring increases employees' job control. The task restructuring interventions in the review consisted of interventions to increase the variety of work tasks, team working interventions where employees were given collective responsibility and decision-making power and the introduction of autonomous work groups. In a concurrent systematic review of organizational-level interventions aiming to increase employee participation, Egan et al (11) concluded that such interventions benefit employee health if employee control improved. It was however also concluded that more research was needed to better understand the most effective means of implementing workplace reorganization to enhance employee participation and control, and that stronger research designs were needed in future research.

Despite the mixed results and lack of high quality study designs, there is, however, a general consensus with regard to components that can support these interventions if present or hinder them if absent. Besides the presence of a structured and step-wise approach and support from management, Kompier (12, 13) and Nielsen (14, 15) have among others emphasized that employee participation is a crucial element for successful interventions.

1.2. EMPLOYEE PARTICIPATION

Employee participation has repeatedly been shown to be crucial to the success of OL-OH interventions due to employees' knowledge, involvement, support, and ownership. Further, employee participation should be integrated in a structured and step-wise approach with employees participating in all phases of the intervention, i.e. the phases of preparation, screening, action planning, implementation, and evaluation (5, 12).

The participatory approach implies that employees in the initial intervention phase participate in the problem analysis, i.e. employees' own assessment of problems at the workplace is key according to this approach to ensure that problems as assessed by employees are addressed (3, 12, 14, 16). Further, the participatory approach implies that employees based on the aforementioned workplace problem analysis take an active part in the development of intervention activities. Employees' participation in the workplace problem analysis and solutions enables intervention activities to be tailored according to the knowledge of employees and needs of the workplace which has the potential to result in meaningful and focused intervention activities that are integrated with daily operations at workplaces (6). Thus, on the one hand the participatory approach aims at increasing involvement, commitment, and control, and on the other hand the approach aims at the implementation of intervention activities tailored the specific and local needs of workplaces. This dual benefit of employee participation was also emphasized by Aust and Ducki (17) as a crucial component of the health circles, of which the main goal is to organize working conditions to decrease harmful aspects of work and improve health. Further, to enhance employee participation, one review emphasised the role of line managers' support (15). Another recent study found that a crucial factor supporting organizational interventions was in-house employee facilitators (18).

In addition to the structured and stepwise approach, management support, and employee participation, other intervention components that have been emphasized include readiness for change (which is how employees receive the intervention and how they are prepared to implement it), and organizational fit of the intervention (which is how the structure and content of the intervention fit the workplace) (19).

1.3. CORE JOB TASKS

An issue that has received less attention within organizational interventions to improve employee health and well-being is that most intervention activities are considered sideline activities with limited or no relevance for the core task at work

(20-22). Kristensen pointed out that developing methods for integrating the working environment and the workplaces' core tasks are key for enhancing implementation and securing management support (20). According to Kompier, measures that appeal to management are needed (12), and Semmer stated that interventions will be more successful if they become an integrated part of daily operations and if they attempt to achieve 'good work' that gives employees a sense of meaning, participation in social life, and a sense of accomplishment (23).

The participatory OL-OH intervention evaluated in this PhD project was not meant to test a specific work stress theory. However, the intervention aimed at improving the working environment by focusing on the core job task. In addition to the above mentioned outset for the intervention, the approach to improve the working environment by focusing on core tasks was also inspired by the work and framework of Semmer et al on Stress-As-Offense-to Self (SOS) (24, 25).

Occupational stressors may cause strain, and strain may increase risk of reduced health and well-being. Strain is more likely to occur when the attainment of goals are threatened (26). Work plays a central role in most peoples' lives (27, 28) and people tend to identify themselves in terms of the identity of a collective or a role (29), at the same time gaining and maintaining a positive self-image is considered of great importance (24, 28). Therefore, work tasks potentially can threaten the self and become stressful in several ways.

According to the SOS framework, illegitimate work tasks may be a potent stressor affecting employees' health (25). Illegitimate tasks are work tasks that are not core to what an employee can be expected to do. Illegitimate tasks are conceptualized as either unnecessary, i.e. they should not be done at all, or as unreasonable, i.e. they are outside one's occupation or occupational status and should be done by others. The illegitimacy of a work task depends on whether the employee perceives the task as being core or peripheral (25). Unnecessary and unreasonable tasks pose a threat to the self because they express a lack of appreciation. The task related lack of legitimacy and the concomitant social message of disrespect associated with carrying out unnecessary and unreasonable work tasks are specific to SOS compared to other stressor concepts, such as job strain (30), effort-reward imbalance (31) or organizational justice (32).

Previous research showed associations between illegitimate tasks and counterproductive work behaviour (33), higher level of cortisol (34), higher level of stress (35), decreased level of mental health (36), sleep disturbances (37), lowered self-esteem (25, 38), and feelings of resentment towards one's organization and burnout (25).

A recent article based on baseline questionnaire data from the study, which was the data base for this PhD thesis, showed that employees' assessment of core task quality was positively associated with job satisfaction and well-being at work. Furthermore, the article concluded that employees with different educational backgrounds, performing different professional core job roles, assessed core task quality differently (39). This indicates that the same task can be either core or peripheral depending on the context and the employee (25). The article by Sasser & Sørensen further points to a lack of attention to the specific work tasks within job design theories that traditionally have focused more on the conditions under which the job is performed instead of the work itself (39).

In addition to support employees' abilities to preserve a positive self-image, focusing on core job tasks may also help to achieve and maintain the management's support of organizational interventions. Organizational interventions have traditionally faced some resistance from management whereas interventions targeted the individual employee increasing his or her coping skills had been more often favored by management (12, 40). Management might be more positive towards organizational interventions with a core task focus because they can be aligned with the purpose of the workplace (20), because they can become an integrated part of daily operations (23), and because they can create closer links to other strategic changes taking place at the workplace, i.e. integration with strategic goals and labor relations (16).

In accordance with the underlying theoretical background of the Pioneer project, I assume in this thesis that an organizational intervention aiming to improve the psychosocial working environment by focusing on the core task at work has the potential to reduce unreasonable and unnecessary tasks. Subsequently employees' work stress level will be reduced leading to changes first, in proximal outcomes close to the actual content of the intervention, in this case increased job satisfaction. Next, I assume that a change in this proximal outcome will lead to changes in intermediary outcomes, in this case reduced exhaustion and sleep disturbances. Finally, I assume that changes in intermediary outcomes will lead to a change in the more distal outcome, namely lower incidence of short-term sickness absence.

1.4. THE PIONEER PROJECT

The Pioneer project was conceived, funded and planned during the years 2009 to 2011, and it was implemented from 2011 to 2013. The intervention was designed using a structured and stepwise approach including a strong component of employee participation. In addition, it was planned to address limitations in previous organizational intervention research by conducting the intervention in a strong

research design including a large number of workplaces, and by using an intervention method that integrated the working environment and core job tasks. The aim of the Pioneer project was to improve the psychosocial working environment by focusing on the core job task and to evaluate the effect of the intervention on psychosocial working environment measures, well-being, short-term sickness absence, and service quality. Further, the aim of the Pioneer project was to assess the implementation of the intervention based both quantitative and qualitative data on the intervention process.

Although the Pioneer project had a focus on the core job task, the content of the intervention was not predetermined but was developed at the individual intervention workplaces, in accordance with Pioneer's participatory approach. Thus, although Pioneer was based on the theoretical assumption that improvements in the psychosocial work environment would have a positive effect on employees' well-being and sickness absence, Pioneer was not meant to test a specific work environment theory, such as job strain, effort-reward imbalance or the SOS theory.

This PhD thesis was funded by and conducted as part of Pioneer project. In this thesis, I conducted a qualitative analysis on the implementation of the intervention and quantitative analyses on the effects of the intervention on well-being and sickness absence.

1.5. WELL-BEING

Since job tasks may be become stressful if they are perceived as unnecessary or unreasonable, being able to focus on core job tasks may help to overcome stressors at work and to avoid strain and negative consequences for health and well-being. In the context of the Pioneer study, measures for well-being at work and psychological well-being included job satisfaction, exhaustion and sleep disturbances.

It is assumed that the opportunity to reduce unnecessary and unreasonable tasks by focusing on core tasks at work is closely related to feeling appreciated, which strongly influences job satisfaction (25). Therefore, job satisfaction was chosen as a general measure of employees' well-being at work being the most proximal employee related outcome of the intervention. It is expected that a change in this proximal outcome is a precondition for changes in more intermediary and distal outcomes.

Exhaustion and sleep disturbances were chosen as intermediary employee related outcomes of the intervention. Exhaustion is a core symptom of the burnout syndrome which is common in human service workers as a reaction on prolonged

work stress (41). Previous research has concluded based on prospective data that changes in the psychosocial work environment can reduce the risk of burnout (42) and further, that burnout increases the likelihood of sickness absence (43).

With regard to sleep disturbances, a recent review showed that psychosocial work factors, such as social support at work, job strain and organizational justice were related to sleep disturbances and called for work environment intervention studies tackling sleep disturbances. The review also called for using stronger research designs and at the same time focusing on the mechanisms in the psychosocial work environment leading to decreased risk of sleep disturbances (44).

1.6. SICKNESS ABSENCE

Absence from work due to sickness has potentially several consequences for the employee, the employer and society. Accordingly, in Danish work environment legislation, sickness absence is a mandatory part of the official, regular workplace risk assessment (45). For the employee, sickness absence is potentially associated with isolation from work and social exclusion from colleagues. To the employer, sickness absence poses a threat to the optimal planning, expected production, delays, increased costs, and distribution of extra work tasks to employees who are not sick. Finally, to society, sickness absence implies potentially reduced production and increased public spending.

It has been suggested to distinguish between short-term and long-term sickness absence. Further, it has been suggested that short-term sickness absence may partly be a reaction, either health-based or coping-based or both, to a problematic psychosocial work environment (46-48). Therefore, short-term absenteeism may be a composite measure consisting of both employees' health and their attitudes towards the job and the employer (6).

Long-term sickness absence, on the other hand, may more often be related to severe diseases (49). Although prolonged exposure to adverse psychosocial working conditions, e.g., job strain or bullying, may increase the risk of severe diseases and disorders, such as cardiovascular disease (50) and depression (51), it was not expected that an organizational intervention focusing on the core tasks at work would affect onset and course of severe somatic diseases and mental disorders. Consequently, short-term sickness absence was chosen as the primary outcome as the distal outcome, i.e. the outcome more far away from the actual content of the intervention. In a supplementary analysis, however, long-term sickness absence was examined to address the intervention's effect on sickness absence in a more comprehensive way.

1.7. AIMS OF THE PHD PROJECT

The specific aims of the PhD project were:

1. To examine the implementation of the Pioneer project (Article 1, Appendix A).
2. To examine whether employees in pre-schools that implemented the Pioneer intervention had an increased level of job satisfaction and a decreased level of exhaustion and sleep disturbances compared to control group employees (Article 2, Appendix B).
3. To examine whether employees in pre-schools that implemented the Pioneer intervention had a lower incidence of short-term sickness absence compared to control group employees (Article 3, Appendix C).

CHAPTER 2. METHODS

To examine employee experiences on how the core task focus impacted the implementation of the intervention and to examine the effect of the intervention on job satisfaction, exhaustion, sleep disturbances and short-term sickness absence, I used three types of data sources: i) individual, qualitative interviews to examine the core task focus in the implementation of the intervention, ii) self-administered questionnaires at baseline and at 24 months of follow-up, and iii) register-based sickness absence from 2010 to the end of 2013.

In this chapter, I present the setting of the intervention, the study design and the three different study samples for the three studies in this thesis. I further describe the intervention method, and the evaluation methods, i.e. qualitative data collection and analysis with regard to components of the implementation, the measurements of the outcomes and covariates, and statistical analyses.

Figure 1 depicts a timeline showing an overview of the course of the Pioneer project and the timing of the intervention phases and activities described in the intervention method section as well as the three different data collections for the three studies.

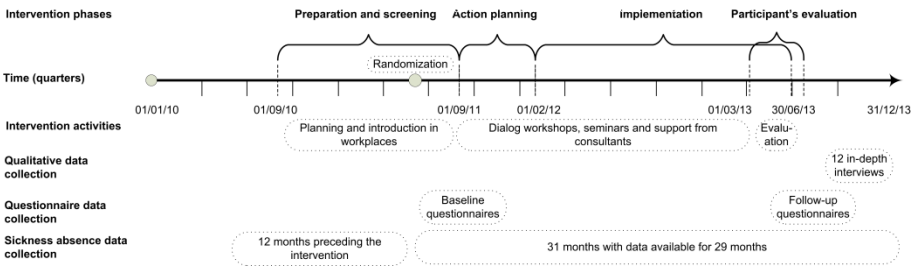

Figure 1. Timeline: intervention phases and activities and data collection

2.1. SETTING

The intervention, called Pioneer project (Danish: 'Pionerprojektet'), included the majority of pre-schools in the Children and Youth Administration in the Municipality of Copenhagen. In Denmark, it is voluntary to attend pre-schools, and

pre-schools are attended by children between the ages of 0 to 6. Attendance is 9.7% (0 years), 89.7% (1-2 years) and 97.5% (3-5 years) respectively (52). About 70% of pre-schools are run by the municipalities, with the remaining 30% run by private organizations (53).

The Pioneer intervention was funded by a grant from the Danish Prevention Fund awarded to an application by a private consultancy company, Grontmij, in cooperation with the Municipality of Copenhagen. Municipality of Copenhagen dedicated additional funding to the intervention. Therefore, only municipal but not private pre-schools were eligible for this study. The intervention was carried out by the pre-schools in cooperation with eight professional working environment consultants from the consultancy company who facilitated and supported the implementation. Aalborg University and the Danish National Research Centre for the Working Environment conducted the research evaluation that was funded by a separate grant from the Danish Working Environment Research Fund.

2.2. STUDY DESIGN AND STUDY SAMPLES

The Pioneer intervention consisted of a regression-discontinuity design (RDD) and a nested cluster randomized controlled trial (RCT) that was parallel and two-armed. For the PhD project, I used data from the RCT part only. All pre-schools in the Municipality of Copenhagen with 10 or more employees were eligible for the study. Seventy eight workplaces formed the cluster RCT. The Municipality of Copenhagen had resources available to conduct the intervention at 44 pre-schools and decided that the remaining 34 pre-schools should serve as the control group. A statistician randomized the workplaces accordingly using a random number generator.

Of the 44 intervention group workplaces, three did not complete the intervention. One workplace dropped out before the intervention started because employees were occupied with other projects; one workplace was closed during the intervention phase; and one workplace left the study because the pedagogical leader had a negative appraisal of the intervention.

Job groups in pre-schools are pedagogical leaders, nursery nurses, nursery nurse assistants, and other job groups. Nursery nurses' educational background is upper secondary education and a bachelor's degree in social education. Nursery nurse assistants may have various educational and professional backgrounds, and their task is to assist nursery nurses. Other job groups were primarily kitchen and cleaning staff and school caretakers.

Study sample for study 1

In September 2013, four of 44 intervention group workplaces were selected for a qualitative study, including study 1. Of the 44 intervention group workplaces, it was decided that 38 workplaces were eligible for the study and that six were not, because they had only been partly or not participating in the intervention. This allocation was based on logbook registrations showing number of show-ups at intervention activities and registrations from quarterly questionnaires conducted with the steering group members and the working environment consultants.

We assumed that the employees at the 38 intervention group workplaces had different appraisals of the value of the intervention. Further, we assumed that a negative appraisal of the intervention could indicate that the workplace had experienced many hindrances with regard to the implementation of the intervention, whereas a positive appraisal of the intervention could indicate high levels of support for the implementation of the intervention. To achieve a broad understanding of support and hindrances related to the implementation, we employed a maximum variation strategy with regard to the appraisal of the intervention (54). In doing so, we used comments written by steering group members and consultants in the quarterly questionnaires, as indicators of the appraisal of the intervention. We selected two workplaces with a positive appraisal of the intervention (A: *'good development'* and B: *'good project'*), one workplace with a less positive appraisal of the intervention (C: *'the money could have been better spent on fewer children per ward instead'*), and one workplace with a negative appraisal of the intervention (D: *'we wanted to leave the project'*).

We included 12 individual, in-depth semi-structured interviews with the pedagogical leader, the shop steward, and the occupational health and safety representative at each of the four workplaces.

Study sample for study 2

Employees were eligible for study 2 if they were employed and present at the intervention and control group workplaces during the time of the baseline questionnaire measurements. Questionnaire measurements were conducted at baseline and at 24 months of follow-up. Of the 34 control group workplaces, four were lost to follow-up, because they did not provide baseline or follow-up measurements. Thus, the analyses were based on 41 intervention (three workplaces did not complete the intervention and consequently not follow-up measurements) and 30 control group workplaces.

In September 2011, 944 employees at the intervention group pre-schools and 616 employees at the control group pre-schools received the baseline questionnaire. Of

these, 775 in the intervention (82.1%) and 470 (76.3%) in the control group responded. Of the 775 intervention group baseline responders, 423 employees responded to the follow-up questionnaire 24 months later, whereas 352 employees were lost to follow up. Due to missing information on some of the outcome measures, the final study sample in the intervention group was n=409 for job satisfaction, n=411 for exhaustion, and n=409 for sleep disturbances. Of the 470 control group baseline responses, 241 employees responded to the follow-up questionnaire, whereas 229 were lost to follow up. The final study sample in the control group was n=228 for job satisfaction, n=234 for exhaustion, and n=226 for sleep disturbances.

Study sample for study 3

The study sample for study 3 consisted of all pedagogical leaders, nursery nurses, nursery nurse assistants and other employees who were employed at the 78 intervention group and control group workplaces at some point in time between June 2011 and December 2013. In accordance with the intention-to-treat principle, we kept the three drop-out workplaces in the analyses. In total, there were 3039 unique participants in the study sample: 1760 in the intervention group and 1279 in the control group.

The follow-up period was from June 1st, 2011 (when workplaces were informed about allocation to either intervention or control group) to December 31st, 2013 (end of data reading in the sickness absence register). Employees who were hired at one of the workplaces after June 1st, 2011 were followed from the date of hiring, and employees who left one of the workplaces before December 31st, 2013 were followed until date of termination.

2.3. INTERVENTION METHOD

The intervention was designed as an open framework with no content requirements regarding changing specific elements of the organisation of work. There were, however, specific requirements to participate in generic invention activities common for all intervention workplaces and to develop and implement workplace specific intervention activities focusing on core job tasks.

Counted from the date when the pre-schools were informed about group allocation (June 2011) until completion of the implementation of the intervention (June 2013), the intervention lasted 25 months.

The intervention was a participatory intervention aiming to improve the working environment by focusing on the core task at work. Participants' participation in the

development and implementation of workplace specific intervention activities was pivotal in this intervention. At each intervention pre-school, the pedagogical leader and two employee representatives, the shop steward and the health and safety representative, formed a steering group that managed the intervention while involving all employees in the pre-school.

A working environment consultant was assigned to each pre-school for the full implementation period (June 2011 to June 2013). The steering group in each intervention pre-school received implementation support from the professional working environment consultant for the full implementation period.

The intervention consisted of intervention activities that all steering groups participated in (from September 2011 to March 2013), i.e. seminars and workshops on how to develop and implement intervention activities tailored their own workplace using a participatory approach, change management training, workplace culture and tools to evaluate changes in the workplace. Based on the seminars and workshops and consultants' implementation support, the steering groups developed and implemented intervention activities tailored their own workplace involving all employees.

The intervention followed a structured and step-wise approach. From September 2010 to September 2011, the intervention project leader team planned and coordinated the intervention study. For five months from September 2011, workplace specific intervention activities were developed by the steering groups with the participation of all employees. Consultants explained to the steering groups and all employees that this intervention's focus on the core task at work was equivalent to develop activities to improve the performance of central work tasks and procedures. From February 2012 to June 2013, the pre-schools implemented the workplace specific intervention activities. Finally, the pre-schools conducted a self-evaluation between March and June 2013, and the implementation support provided by the consultants ended by the end of June 2013.

2.4. QUALITATIVE INTERVIEWS AND ANALYSIS

As stated by Griffiths (55) '… an organisational intervention cannot take place outside the participation and experience of the subjects under study'. We chose to use a qualitative evaluation approach because qualitative methods can be applied to better understand the various experiences and implications of the implementation and dynamics of the implementation process (20, 55-57) - in this case to examine how focusing on core job tasks supports or hinders the implementation.

I conducted the 12 individual interviews between October 9 and November 5, 2013 using a semi-structured interview guide informed by five analytical categories: *core*

task, employee participation, management support, readiness for change, and *organisational fit*. After a short introduction to the interview and the purpose of the study, the 12 interviewees were asked to elaborate on their experiences with the intervention with regard to content, process and outcomes. Each interview lasted between 50 and 90 minutes. To maximise the reliability of the analysis, all interviews were audio recorded and transcribed in full. To focus on the five analytical categories and their relationships, all interview transcripts were template coded using the five categories (58). Cross-sectional indexing was applied (59) to locate similarities and differences with regard to the analytical categories across interviews from the four workplaces. I used the qualitative analysis software package NVivo 10. Template codes were approved by the second author of study 1. I also interviewed three or four employees from each of the four workplaces, who were not part of the steering group. Based on screening of these interviews, we determined that they did not add significant value to the analyses in study 1.

In the first part of the analysis, interview extracts with the code *core task* was used to identify experiences with and implications of the implementation with regard to the development and implementation of intervention activities focusing on the core task (the key intervention component). In the subsequent parts of the analysis, interview extracts with the codes *employee participation, management support, readiness for change,* and *organisational fit* were used to identify how these additional intervention components supported or hindered implementation and how they were related to the key intervention component.

2.5. MEASUREMENT OF SICKNESS ABSENCE

Sickness absence data was retrieved from Copenhagen's municipal sickness absence register, using participants' unique civil registration number that is assigned to all Danish residents. The retrieved data was stored at a special secured intranet drive at NRCWE and the civil registration number was replaced by an anonymized serial number. All analyses were conducted with this fully anonymized data set. Short-term sickness absence was defined as absence of 14 calendar days or less in accordance with previous Danish studies (60).

The effect measure was number of short-term sickness absence days per person-year during a 29-months follow-up. The number of calendar days with short-term sickness absence was registered monthly for each participant counting from the first to the last calendar day of absence. The monthly number of days with short-term sickness absence could exceed 14 days, but a single, uninterrupted absence period had to be 14 days or less to be considered short-term sickness absence. We excluded long-term sickness absence, part time sickness absence, absence due to pregnancy

related sickness and children's sick days. We allowed for that short-term sickness absence could occur more than once in the same person within the predefined time period. With regard to short-term sickness absence, the population was dynamic since new participants were added during the follow-up period and since some participants terminated their employment before the end of the follow-up period. Participant's monthly update on employment status enabled us to calculate time at risk for short-term sickness absence for each participant.

To rule out that potential changes in short-term sickness absence were explained by changes in long-term sickness absence, the effect of the intervention on long-term sickness absence was analyzed in a supplementary analysis. In this supplementary analysis, long-term sickness absence was defined as absence of 15 consecutive days or more.

2.6. MEASUREMENT OF JOB SATISFACTION, EXHAUSTION AND SLEEP DISTURBANCES

Job satisfaction, exhaustion and sleep disturbances were measured with self-administered questionnaires at baseline and at 24 months of follow-up. Both intervention and control group employees received and responded to the questionnaires during working hours.

Job satisfaction was chosen as a general measure of employees' well-being at work and was measured with one item (Regarding your work in general. How satisfied are you with your job as a whole, everything taken into consideration?'), rated on a four-point scale (very satisfied, satisfied, dissatisfied, very dissatisfied) (61). Exhaustion ('Within the past two weeks, how much of the time have you felt lacking in energy and strength?') and sleep disturbances ('Within the past two weeks, how much of the time have you had trouble sleeping at night?') were measured with one item each, derived from the Major Depression Inventory. Responses were rated on a six-point scale (all of the time, most of the time, slightly more than half of the time, slightly less than half of the time, some of the time, at no time) (62). Higher scores indicate more job satisfaction, more exhaustion and more sleep disturbances.

2.7. MEASUREMENT OF COVARIATES

Covariates in both study 2 and 3 were employee (age, sex, and job group) and workplace (workplace type, and workplace size) characteristics retrieved from the municipal sickness absence register that we linked to the baseline and follow-up questionnaire data. In addition, baseline scores of job satisfaction, exhaustion and

sleep disturbances were used as covariates in study 2. Finally, workplace average level of short-term sickness absence in the 12 months preceding the intervention was used as a covariate in the analysis of the effect of the intervention on short-term and long-term sickness absence in study 3.

2.8. STATISTICAL ANALYSIS

All statistical analyses were conducted using the software package SAS 9.3 (SAS Institute, Cary, NC, USA).

In study 2 and study 3, I analyzed employees as clustered within workplaces, i.e. measurements on employees within the same workplace were assumed to be correlated because they tend to have a more similar working environment than employees from different workplaces (63). With regard to short-term sickness absence, the variable was measured repeatedly on a monthly basis for up to 29 months within the same participant. Repeated measurements on the same participant over time were also assumed to be correlated because each participant tend to be more like oneself compared to other participants (63). In normal regression models, measurements are assumed to be independent of each other. The Genmod procedure in SAS however, takes the clustering effect of workplaces and the correlation of repeated measurements of each participant into account by including them in a repeated statement. Therefore, I included anonymized workplace and personal identification number in a repeated statement.

Statistical analysis in study 2

First, to test baseline differences between the intervention and the control group in the study sample, Chi-square test was used for categorical variables, two sample t-test for continuous variables and the general linear modelling procedure for testing differences in continuous variables with the adjustment for employee and workplace characteristics.

The next step was to calculate with-in group changes in job satisfaction, exhaustion and sleep disturbances. In doing so, first, baseline and follow-up mean scores for each outcome variable were calculated separately for the intervention and the control group. Second, paired t-tests were used to analyze changes from baseline to follow-up for each outcome variable, separately within the intervention and within the control group.

The next step was to calculate between-group changes for the three outcome variables. The Genmod procedure in SAS was used to analyze differences in

changes in job satisfaction, exhaustion and sleep disturbances between the intervention and the control group during follow-up in a mixed model with a repeated statement to account for the clustering effect of workplaces.

I calculated unadjusted estimates and estimates adjusted for sex and age (continuous) (Model 1) and further adjusted for job group (pedagogical leader, nursery nurse, nursery nurse assistant, other job group), workplace type (integrated, day care, kindergarten) and workplace size (continuous) (Model 2).

Finally, I conducted post-hoc analyses, in which I repeated the between-group analyses while adjusting for the baseline scores of the outcome variables.

Statistical analysis in study 3

Using Poisson regression with time at risk for short-term sickness absence as an offset variable, I tested differences in incidence rates in short-term sickness absence between the intervention and control group. Study 3 includes advanced statistical analyses that I conducted in collaboration with and under supervision of statistician Jacob Pedersen, PhD. Thus, the analyses for article 3 were a group effort. This said, I choose to write that "I" conducted the analysis to make clear that I take the final responsibility for the analyses.

Each day a participant went on sickness absence during follow-up was calculated as an incident event, as long as the spell to which the sickness absence day belonged was not longer than 14 days. Thus, a person who had during a calendar year one spell with eight sickness absence days, one spell with 18 sickness absence days and one single sickness absence day, would be counted with nine incident events. I used this procedure to optimize exploitation of the available information given by the data that included monthly updates on number of days with short-term sickness absence (63).

I calculated the incidence rate of short-term sickness absence, i.e. the number of events of short-term sickness absence per person-year, for both the intervention and control group and calculated the rate ratios (RR) for comparing the two groups. I calculated both unadjusted RR and RR adjusted for sex and age (continuous) (model 1) and further adjusted for job group, workplace type, workplace size (continuous) and workplace average level of short-term sickness absence during the 12 months preceding the intervention (continuous) (model 2).

Using the offset variable, each participant's short-term sickness absence risk was adjusted according to the participant's own time at risk. I used monthly updates on

short-term sickness absence from June 1st, 2011 to December 31st, 2013. Due to technical problems, we were not able to obtain data from the 11th and 12th months of 2012 therefore the analyses are based on 29 instead of 31 months.

To account for over-dispersion I used the Dscale option, and I included anonymized workplace and personal identification number in a repeated statement.

I conducted three supplementary analyses. First, I examined whether the intervention effect was similar when I excluded the first 12 months of follow-up (June 2011 to May 2012), a time period that was characterized mainly by action planning and first intervention activities. If an effect of the intervention was found in these first 12 months but not afterwards, this might indicate that the effect was not due to the intervention, but instead was due to other factors, for example an enhanced focus on sickness absence. Second, I explored in post-hoc analyses whether the effect of the intervention differed by participants' age (<36, 36-50, >50), sex, and job group (pedagogical leaders, nursery nurses, nursery nurse assistants, other job groups). Third, I analyzed the effect of the intervention on long-term sickness absence (absence of 15 consecutive days or more). I had not hypothesized an effect of the intervention on long-term sickness absence. However, this supplementary analysis on long-term sickness absence is important to rule out that a reduction in short-term sickness absence was achieved by an increased risk of long-term sickness absence. In contrast to the analyses on short-term sickness absence, in which sickness absence was allowed to occur more than once in a person, I analyzed the effect on long-term sickness absence as a time-to-event analysis, i.e. participants did not re-enter the analyses after the first day of a long-term sickness absence spell had occurred (64).

CHAPTER 3. RESULTS

This chapter summarizes the results of the three studies. The full research articles are included in the appendices A to C.

3.1. IMPLEMENTATION OF THE INTERVENTION – FOCUSING ON THE CORE TASK (ARTICLE 1)

Problem statement

This qualitative study examined employees' experiences from a multiple case study of four selected pre-schools to evaluate how focusing on core job task supports or hinders the implementation of the Pioneer intervention.

Main findings

The analysis of the interview parts with the code *core task* showed that several workplace specific intervention activities were developed and implemented to change professional and organizational conditions to improve the performance of the core task. Thus, the intervention's core task focus resulted in intervention activities targeting an indirect improvement of core tasks, since the intervention activities were not about the actual pre-school work (engaging and caring for the children). At a dialog workshop, the steering group and employees developed and prioritized ideas for improving the core task. Throughout the intervention period employees used an implicit understanding of which work tasks were most central that guided the implementation. Using a focus on core job tasks as the key intervention component supported the implementation as several intervention activities were developed and implemented at all four workplaces despite different appraisals of the intervention.

The analysis of the interview parts with the codes *employee participation and management support* showed that the steering groups increased their cooperation as a result of this intervention. In addition, steering groups at all four workplaces involved the employees. However, the analyses showed that not all employees at each workplace were involved in all activities during the implementation. This was in accordance with the intentions of the intervention. According to the interviewees, the degree to which the steering group involved the employees was determined by two factors. First, the steering group involved the employees enough to receive the contribution needed from employees in order to develop and implement intervention

activities tailored the workplace. Second, the steering group involved the employees enough in order to communicate about the intervention to justify time spent on the intervention by the steering group. These findings applied to all four workplaces independent of differences in the appraisals of the intervention and supported the implementation.

The analysis of the interview parts with the code *readiness for change* showed that the intervention was well received at the two workplaces A and B. Employees at these two workplaces were immediately prepared to develop and implement intervention activities because the intervention was perceived to be useful and supportive for their workplaces. Contrary to these findings, employees at the workplaces C and D were not prepared and ready for participation in the intervention. Employees at these workplaces experienced the intervention as something unwanted and imposed upon them by the Municipality.

With regard to the interview parts with the code *organizational fit of the intervention* the analysis also showed opposite findings. We assessed the *organizational fit* to be high at workplace A and B given that seminars, workshops and consultants' implementation support were perceived to be of significant value. Interviewees stated that the intervention was beneficial in that it enabled them to adjust intervention activities to fit the needs at their workplaces. Contrary to these findings, we assessed the *organizational fit* to be low in workplace C and D. In workplace C interviewees stated that the intervention missed the point, was a waste of time, lacked a common thread, and was too expensive. Further, there were several accounts of employees having felt patronized. In workplace D, interviewees felt unfairly allocated to the intervention group of the Pioneer study, i.e. they did not think that they needed an intervention aiming to improve the working environment or to reduce sickness absence. Further, interviewees at workplace D experienced the intervention as an act of creating problems in order to solve them, and since they did not think they had any problems, they felt that the intervention was a waste of their time.

All four workplaces developed and implemented intervention activities and showed similar patterns with regard to the analyses of core task, employee participation and management support. Thus, this was the case despite hindrances related to readiness for change and organisational fit. Therefore, the core task focus might have the potential to compensate for hindrances related to lack of readiness and fit.

Conclusion

I found among four selected intervention group workplaces that the workplaces addressed professional and organizational conditions, such as improving the communication, organization of staff meetings, and working and holiday schedules, that are needed to improve the performance of core job tasks. Focusing on core job tasks supported the implementation along with employee participation and management support. There were however, both supportive mechanisms and hindrances associated with workplaces' readiness for change and the organizational fit of the intervention depending on workplaces' appraisal of the intervention. The analyses suggest that the focus on the core task had the potential to compensate for hindrances related to lack of readiness and fit.

3.2. EFFECT OF THE INTERVENTION ON JOB SATISFACTION, EXHAUSTION AND SLEEP DISTURBANCES (ARTICLE 2)

Hypothesis

The hypothesis of this study was that the Pioneer intervention, which was a participatory organizational-level occupational health intervention that aimed to improve the working environment by focusing on core job tasks, would lead to increased job satisfaction and reduced exhaustion and sleep disturbances in the intervention group compared to the control group.

Main findings

With regard to within group changes from baseline to follow-up, I found that exhaustion decreased statistically significantly in both the intervention group (-0.16 points, $p=0.01$) and the control group (-0.29 points, $p<0.001$). There was no statistically significant change in job satisfaction and sleep disturbances, neither in the intervention group nor the control group in the within group analyses.

When analyzing between-group changes, there was no statistically significant difference between the intervention and control group for any of the three variables, neither in the crude nor in the adjusted analyses (all p-values > 0.20).

Supplementary findings

The intervention and control group differed statistically significantly in the baseline scores of the three outcome variables. When repeating the between-group analyses, while adjusting for the baseline scores of the outcome variables, I found that estimates from this post-hoc analysis were similar to the estimates in the main analysis.

Conclusion

There was no evidence that participating in an organizational-level occupational health intervention aiming to improve the working environment by focusing on the core task at work had an effect on pre-school employees' job satisfaction, exhaustion and sleep disturbances.

3.3. EFFECT OF THE INTERVENTION ON SHORT-TERM SICKNESS ABSENCE (ARTICLE 3)

Hypothesis

The hypothesis of this study was that the Pioneer intervention, which was a participatory organizational-level occupational health intervention that aimed to improve the working environment by focusing on core job tasks, would lead to a lower risk of short-term sickness absence in the intervention group compared to the control group.

Main findings

During the 29 months of follow-up, the number of estimated days with short-term sickness absence was 8.68 per person-year (unique participants=1760, number of months=28 353, total number of sickness absence days=20 583) in the intervention group and 9.17 per person-year (unique participants=1279, number of months=19 554, total number of sickness absence days=14 903) in the control group. The RR for short-term sickness absence in the intervention group compared to the control group in the crude analysis was 0.93 (95% CI=0.86-1.00). The RR was 0.90 (95% CI=0.84-0.97) when adjusting for age and sex and 0.89 (95% CI=0.83-0.96) when further adjusting for job group, type and size of workplace, and workplace average level of short-term sickness absence during the 12 months preceding the intervention.

Three supplementary findings

When repeating the main analysis (that was based on 29 months of follow-up) while excluding the first 12 months of follow-up, results were similar. During the 17 months of follow-up, the number of estimated days with short-term sickness absence was 8.00 per person-year (unique participants=1446, number of months=16 474, total number of sickness absence days=11 020) in the intervention group and 8.76 per person-year (unique participants=1002, number of months=11 285, total number of sickness absence days=8235) in the control group. The RR was 0.91 (95%

CI=0.84-0.98) in the crude analysis and 0.88 (95% CI=0.81-0.95) in the fully adjusted analysis.

When performing post-hoc analyses stratified for participants' characteristics, some of the subgroups became relatively small (e.g. men and pedagogical leaders), resulting into estimates with wide confidence intervals. None of the differences between the sub-groups were statistically significant. When only looking at the effect estimates and at subgroups of similar size, the results may suggest that there was a trend towards a stronger intervention effect with increasing age of the participants.

Finally, a supplementary analysis showed that the intervention was also associated with a reduced risk of long-term sickness absence with a crude RR of 0.83 (95% CI=0.69-0.99) and an adjusted RR of 0.84 (95% CI=0.69-1.01).

Conclusion

Pre-school employees participating in an organizational-level occupational health intervention aiming to improve the working environment by focusing on the core task at work had a lower incidence of short-term sickness absence during a 29-months follow-up than control group pre-school employees.

CHAPTER 4. CONCLUSION AND DISCUSSION

The first aim of the thesis was to examine whether focusing on core job tasks supported or hindered the implementation of the Pioneer intervention. I found among four selected intervention group workplaces that the workplaces addressed professional and organizational conditions, such as improving the communication, organization of staff meetings, and working and holiday schedules, that are needed to improve the performance of core job tasks. Along with employee participation and management support, core task focus supported the implementation of intervention activities. As regards readiness for change and the organizational fit of the intervention, I identified both supportive mechanisms and hindrances depending on workplaces' appraisal of the intervention. Study 1 therefore suggested that the core task focus had the potential to compensate for hindrances related to lack of readiness and fit.

The second and the third aims of the thesis were to evaluate the effect of the Pioneer intervention in terms of increased job satisfaction and reduced exhaustion and sleep disturbances and incidence of short-term sickness absence in the intervention group compared to the control group. Study 2 found no evidence that participating in the Pioneer intervention had an effect on pre-school employees' job satisfaction, exhaustion and sleep disturbances. Study 3, however, found that participating in the Pioneer intervention resulted into a lower incidence of both short-term and long-term sickness absence in intervention group participants compared to control group participants during a 29-months follow-up.

4.1. EFFECT ON DISTAL BUT NOT ON PROXIMAL AND INTERMEDIARY OUTCOMES

As delineated in the introduction section, previous studies of organizational interventions to improve employee health and well-being found inconsistent results. The results of this thesis are also inconsistent. Taking findings from study 2 and study 3 together, it seems that the intervention was efficacious with regard to sickness absence but not with regard to job satisfaction, exhaustion and sleep disturbances. Thus, based on this thesis' evaluation of the Pioner intervention's overall effects, the intervention was efficacious with regard to the distal outcome, i.e. the outcome more far away from the content of the intervention, but was not efficacious with regard to the proximal and intermediary outcomes. It therefore

seems that, although there was an effect of the intervention on sickness absence, this effect did not go via increased employees' health and well-being, but via other pathways. It is unclear what these pathways might have been. One possibility is that the intervention has enhanced the focus on sickness absence and that intervention group participants have been pressured into not taking sick leave. This explanation seems doubtful, though, because there was a general strong focus on sickness absence at all pre-schools during the study period, and not just at the intervention pre-schools. Another possible explanation is that the intervention changed employees' attitudes towards their job and their employer and consequently it resulted in changes in behaviour with regard to sickness absence without any change in health and well-being. However, the fact that the intervention was efficacious not only with regard to short-term sickness absence, but also with regard to long-term sickness absence that has been shown to be a good indicator for severe health problems (65, 66), suggests that the intervention did positively impact employees' health, at least to some extent.

One has to be cautious with drawing conclusions based on comparison of study 2 and study 3, because the two samples were only partly overlapping. In study 3, sickness absence register data was available to assess the outcome variable. It was therefore possible to analyze sickness absence for all employees at all workplaces, including employees who left the workplace during follow-up (who were excluded on the day they left their workplace) and employees who newly started at a workplace during follow-up (who were included on the day, they entered the workplace). In study 2, register data on job satisfaction, exhaustion and sleep disturbances, was not available and therefore in study 2 analyses were restricted to employees who filled in the questionnaire at both baseline and follow-up. Consequently, whereas study 3 was based on data from 3039 participants, with no loss to follow-up, study 2 was based on data from 1245 baseline participants of which 581 (46.7%) were lost to follow-up, yielding an analytic sample of only 664 participants.

Moreover, sickness absence was assessed with monthly updates throughout a 31 months follow-up period with data available for 29 months, whereas job satisfaction, exhaustion and sleep disturbances were only assessed twice, at baseline and at the follow-up measurement after 24 months. Thus, whereas it was possible to monitor sickness absence on a month to month basis during the whole follow-up period, we only know the status of job satisfaction, exhaustion and sleep disturbances at the two measurement points at baseline and follow-up, but not how these three variables may have fluctuated between the two measurement points. Further, job satisfaction, exhaustion and sleep disturbances were measured using single items. It would have been better to apply more comprehensive scales for measuring job satisfaction (e.g.

the four item job satisfaction scale in the second version of the Copenhagen Psychosocial Questionnaire (61)), exhaustion (e.g. Maslach's Burnout Inventory (41) or Copenhagen Burnout Inventory (67)) and sleep disturbances (e.g. the four item sleeping trouble scale in the second version of the Copenhagen Psychosocial Questionnaire (61)). Finally, other measures of employee well-being than job satisfaction, exhaustion and sleep disturbances could also have been relevant to include, e.g. the WHO-5 Well-being Index (68).

4.2. THEORETICAL AND METHODOLOGICAL CONSIDERATIONS

When an intervention study failed to show an impact of the intervention or when an intervention study showed mixed results, two main explanations have to be considered: theory failure or implementation failure (20). Theory failure refers to that the theory was wrong. In the case of this study, this would mean that the theoretical assumption was wrong that a participatory organizational-level intervention aiming to improve the working environment with a focus on the core tasks at work would result in less job stress, which subsequently would result in more job satisfaction and less exhaustion and sleep disturbances and consequently in reduced risk of short-term sickness absence. Implementation failure refers to that the theory was correct, but that the intervention was not appropriately implemented and that the impact of the intervention, therefore, could not be evaluated.

It is difficult to decide whether theory or implementation failure or other mechanisms are the most likely explanations for the mixed results. Study 1 showed that the four workplaces implemented workplace specific intervention activities to solve organizational and professional conditions that were necessary to improve the performance of the core task. Thus, study 1 indicates that the intervention was appropriately implemented in at least these four selected workplaces. In addition, the effect on the risk of short-term sickness absence suggests that implementation failure is not likely.

There are, however, arguments for as well as against theory failure in the case of this study. This study is unique because to my knowledge, this study is the first RCT showing that an intervention addressing the core task at work leads to a reduced risk of sickness absence. This result concurs with the key assumption of the SOS theory that focusing on the core task at work is beneficial for employees' health and wellbeing (24). Further, reviews of the literature have emphasized that increasing employees job control may be key for the success of organizational interventions (10). Although increasing job control was not an explicit aim of the Pioneer intervention, it is possible that the intervention's participatory component, where

intervention activities were shaped in accordance with employee needs and knowledge, increased employees' job control.

Further, the result from the subgroup analyses showing a tendency that older compared to younger employees may have benefited more from the intervention corresponds to previous research reporting that the association of unnecessary tasks at work with declining mental health was stronger among older workers than younger workers (36). The subgroup analysis results should be viewed with caution, though, not only because they were post-hoc but also because some of the subgroups were relatively small, resulting into wide confidence intervals.

It is difficult to be certain whether it was indeed the focus on the core tasks at work that resulted in the reduced risk of short-term sickness absence or if other mechanisms were at work. It might be argued that some intervention group activities were specifically targeted towards reducing sickness absence and that these activities may have had a particular strong impact on reducing sickness absence. This is, however, not a likely explanation for the lower risk of sickness absence in the intervention group compared to the control group, because there was a general strong focus on sickness absence in all pre-schools in the Municipality of Copenhagen during the intervention period, both in the intervention and in the control group pre-schools which I will return to later.

Another mechanism that might be at work instead of or together with the core task focus was the establishment and the education of the steering group consisting of the pedagogical leader, the shop steward and the working environment representative. It is possible that an educated and strengthened steering group has had an impact on the reduced risk of sickness absence. Integrating the three areas of responsibility (day-to-day management, trade union work, and health and safety at work) in one steering group that follows a participatory approach might contribute to increased job control and healthier work conditions leading to a reduced risk of sickness absence.

Further, study 1 revealed another possible theory failure. Study 1 assumed that the core task focus and the participatory approach would ensure employees' readiness for and the organisational fit of the intervention because the intervention activities could be tailored to the knowledge of employees and the needs of the workplace. However, study 1 indicated that a lack of readiness and organisational fit may, nevertheless, occur in such an intervention. Employees in some workplaces perceived the intervention as yet another task to be solved among several other externally imposed requirements. Further, study 1 showed opposite findings with regard to readiness and organizational fit. On the one hand, some employees

reported that there were significant values and benefits in the seminars, workshops and consultants' implementation support, and that these activities have helped them to fit the intervention activities better to the needs at the workplaces. On the other hand, other employees perceived the intervention as unnecessary and unwanted. Some employees even experienced the intervention as an act of creating problems in order to solve them, and since they did not think they had any problems, they felt that the intervention was inappropriate. It can be argued that this lack of organizational fit is a theory failure because the success of the Pioneer intervention requires a certain logic and agreement with the underlying assumptions that employees see the need to and that they can and want to take part in problem identification and solution development to improve health and well-being at work.

To qualitatively further study implementation hindrances and lack of participation in the intervention, future studies could also include workplaces that dropped out of the intervention or workplaces that were only participating to a limited degree into the implementation analysis.

In addition to theory or implementation failure, methodological issues may be a reason for the inconsistent findings. Study 2 showed a highly significant difference between the intervention and control group in all three outcome variables at baseline, with the intervention group showing more job satisfaction and less exhaustion and sleep disturbances. These differences could not be explained by different employee or workplace characteristics in intervention and control group. Because of these differences in baseline scores of the outcome variables, it was more difficult for the intervention group than for the control group to show improvements during follow-up. There are at least two possible explanations why the two groups differed at baseline. One possible explanation is that this was due to chance as the study was a cluster- and not an individual-randomized trial with only 78 clusters. Another explanation could be the setting when the baseline questionnaire was filled in. Intervention and control group participants filled in the questionnaire after they had been informed about the result of the randomization and it is possible that this has resulted in a better mood in the intervention group compared to the control group, which may have caused reporting of more job satisfaction and less exhaustion and sleep disturbances.

4.3. CONTAMINATION

Study 2 showed that the intervention as well as the control group showed a statistically significant reduction in exhaustion. It could be that the reduction was an effect of the intervention, if we assume that intervention knowledge has spread from intervention group pre-schools to control group pre-schools. Such a contamination

was indeed possible as there was contact and exchange between managers of intervention and control group pre-schools. This explanation is, however, speculative and based on non-systematic observations.

When comparing number of sickness absence days per person-year of the follow-up period with the number of sickness absence days per person-year of the year preceding the randomization, study 3 found that the numbers in the year before the intervention were markedly higher, both in the intervention group and in the control group. It is difficult to say what caused this difference, but it might be that the Municipality of Copenhagen's initiatives to improve core pedagogical processes and their general strong focus on sickness absence in this time period including the implementation of mandatory sickness absence dialog meetings with the managers may have played a role. Further, contamination between intervention and control group pre-schools cannot be ruled out.

4.4. STRENGTHS AND LIMITATIONS

General strengths of the study are the cluster RCT design with 78 workplaces and the comprehensive, structured and step-wise intervention approach. Further, the intervention was implemented by eight professional working environment consultants, with one consultant managing the implementation and securing that all pre-schools received the same overall intervention.

A strength with regard to study 1 was the sampling approach that ensured the inclusion of pre-schools with different appraisals of the intervention, including negative appraisal, which allowed to study hindrances associated with the implementation. The steering group of that workplace was reluctant to participate in the qualitative study and in the beginning even dismissive of participating in the qualitative interviews. A further strength of study 1 was the systematic and identical treatment of all 12 interviews allowing for comparison as regards the theoretical categories across participants and settings. A strength with regard to study 2 were the high baseline response rates in both the intervention and the control group. Finally, with regard to study 3, a major strength was the use of employer register data on sickness absence that eliminated recall bias and allowed the inclusion of all pre-schools in the intention-to-treat analyses. Further, the employer sickness absence register included information on monthly updates on employment status and the number of days with sickness absence allowing taking time at risk for short-term sickness absence into account.

The Pioneer project hypothesized an overall effect of the Pioneer intervention on employee well-being and short-term sickness absence. However, in the future it

would be a good idea to examine whether the Pioneer intervention is particularly efficacious in some subgroups of the samples. The Pioneer intervention was a primary work-directed prevention intervention, but employees at workplaces are typically a rather mixed population with regard to mental and physical health status. In future analyses, it therefore would be relevant to assess the effect of the Pioneer intervention stratified by employees' different backgrounds with regard to history of sickness absence, use of prescription medications, and other information on mental and physical health status.

There are, however, also important limitations of the study. Concerning study 1, I only interviewed each of the 12 participants once. The qualitative study was conducted by the end of the implementation of the intervention to enable interviewees to give their accounts of the full period of implementation. By interviewing participants only once about a two year long implementation of a comprehensive intervention, it was not possible to examine how focusing on the core job tasks might have evolved or changed over time during the different intervention phases. Further, study 1 only included interviews with the steering group members responsible for the implementation. The decision to only include interviews with the steering group members rests on the fact that two members of the steering group were employee representatives and that they were interviewed in that role. However, to achieve a broader understanding of employee participation in the Pioneer intervention, it might had been better to examine employee participation by including interviews with regular employees from each of the four pre-schools. This would also make it possible to compare the direct and indirect involvement and participation of employees. Such a study would be possible based on the Pioneer project's qualitative data collection and would add to recent studies on the supportive mechanisms of line managers' support of organizational interventions (15) and in-house employee facilitators (18).

Concerning study 2, all participants filled in the baseline questionnaire after they had been informed about the result of the randomization. It is possible that knowledge on allocation to either intervention or control group has had an effect on the baseline scores, in that it could have created a better mood in the intervention group compared to the control group, which may have caused the reporting of more job satisfaction and less exhaustion and sleep disturbances. Further, study 2 used single items to measure outcome variables and therefore was based on measurements of only limited aspects of job satisfaction, exhaustion and sleep disturbances. Results from study 2 may have been different had these three outcome variables been measured more comprehensively. Finally, 24 months between the two measurements at baseline and follow-up is a rather long follow-up period. It

could be that there would have been an effect after for example 12 months follow-up that did not remain at 24 months follow-up.

Concerning study 3, a limitation is that only one data entry per participant per month per sickness absence type was available in the employer sickness absence register. Therefore, the monthly number of sickness absence days could reflect one sickness absence spell or several spells that were added up.

Within OL-OH intervention research, there is an increased focus on using new evaluation approaches, for example what has been termed as "realistic evaluation", to address how, when, and why interventions have effects on outcomes (8, 69). Therefore, it can be considered a limitation of this thesis, that I followed a traditional effect evaluation method for RCT's, supplemented by one qualitative study, and did not further evaluate the intervention processes.

Because of the evaluation design comparing all participants within all intervention group pre-schools to all participants within all control group pre-schools (apart from the stratified post-hoc analyses in study 3), I do not know whether different intervention approaches in the intervention group pre-schools had resulted in different effects. Supplementary effect evaluation to draw conclusions with regard to different intervention approaches' impact on the effect of the intervention is beyond the scope of this thesis, but is highly relevant. This could be done by repeating analyses from study 2 and 3 with the adjustment for or stratification of different intervention approaches or other information regarding the implementation of the intervention. This information is available in two quarterly surveys conducted five times each during the Pioneer intervention to document the intervention process with regard to expectations to the intervention, management support, employee participation and different types of intervention activities. One survey evaluated the process from the perspective of the professional working environment consultants and the other survey from the perspective of the steering group members managing the implementation.

4.5. PERSPECTIVES

Although the Pioneer intervention showed inconsistent findings, the statistical significant effect on sickness absence suggests that focusing on core job tasks may be a promising approach for organizational interventions. The Pioneer intervention was conducted within public sector pre-schools and therefore results cannot be generalized to other settings. Because of the results with regard to short-term and long-term sickness absence and because the approach seemed to enhance implementation, it seems worthwhile to test the intervention concept in other job

groups as well. Future studies should examine the intervention concept in private sector pre-schools and in employees doing different work than pre-school work. Further, having fulfilled the aims with regard to evaluate the overall effects of the Pioneer intervention and having only conducted one qualitative study on the implementation, it is relevant to conduct future studies to gain more insight into the mechanisms of the Pioneer intervention.

As described earlier, this PhD thesis was a part of the larger Pioneer project. Results from other Pioneer project analyses have been presented in the final project report (70) and in an article by Sasser and Sørensen (39). These results have not been addressed in this thesis but may be considered for future development. One analysis performed in an earlier phase of the Pioneer project indicated that some process variables had an effect on the outcomes of the Pioneer intervention. Increased intervention intensity, learning of the steering group, management support, and time spent on the intervention were associated with more favorable changes in "arbejdsmiljøarbejde" (Danish term describing "activities for improving the work environment"), core task quality, employee well-being, and sickness absence (70). In the light of this thesis, it would be relevant to repeat and to further investigate the process evaluation of the Pioneer intervention. Further, since core task quality was positively associated with job satisfaction and well-being (39), it would be relevant to test whether improvement in core task quality during the intervention period results in increased job satisfaction and decreased exhaustion and sleep disturbances. Finally, merging of the Pioneer data with Danish health registry data (for example on purchase of prescribed medication or on visits at general practitioners) would allow investigating whether or not the reduction in sickness absence in Pioneer also reflects improvements in employees' health.

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APPENDICES

Appendix A. Article 1

Implementation of a Participatory Organisational-Level Occupational Health Intervention - Focusing on the Primary Task

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Appendix B. Article 2

Effect of a participatory organizational-level occupational health intervention on job satisfaction, exhaustion and sleep disturbances: results of a cluster randomized controlled trial

Under review in BMC Public Health.

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Appendix C. Article 3

Effect of a participatory organizational-level occupational health intervention on short-term sickness absence: a cluster randomized controlled trial

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